

# Overcoming Barriers to Ecologically Sensitive Land Management

## Conservation Subdivisions, Green Developments, and the Development of a Land Ethic

*Robert H. Thompson*

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The future building and rebuilding of our communities will greatly influence the future quality of our natural environment. Development patterns and site management influence biodiversity (Dramstad, Olson, and Forman 1996; Peck 1998), water quality (Beach 2002; Schueler and Holland 2000), and air quality (Calthorpe and Fulton 2001). Quite encouragingly, a growing number of “green” developments have attempted to do such things as protect or restore functional open space, protect water quality, conserve farmland, and reduce energy use.<sup>1</sup> Still, the management decisions of the individual property owners will affect the ultimate success of even the best green developments. If aggressive exotic species are planted, if excess fertilizer reaches surface waters, if pets run loose, if drainage swales are modified, or if buffers are encroached upon, the natural environment will suffer.

While private property owners are an essential part of the solution to a number of environmental problems, most are ill equipped to be responsible managers. More than thirty years after the publication of *Design with Nature* (McHarg 1971) and more than fifty years after the publication of *A Sand County Almanac* (Leopold 1949/1968), most people know little about the predevelopment ecological processes of the place where they live or about how development has negatively affected those processes. Increasingly, planners and designers are arguing that people must be educated about the ecology of their places.<sup>2</sup> Yet environmental education alone is not enough to achieve more environmentally sensitive land management. Environmental psychologists have shown that education, even if it changes attitudes, does not guarantee more environmentally sensitive behavior (Stern 2000). In fact, the gap between environmental education and environmental action is one with which environmental educators continue to struggle (Scott 2002). Consequently, when one thinks about creating a land ethic for residents of a green development, one needs to think about the *barriers* to more environmentally responsible behavior and how to remove or overcome those barriers.

This article begins by discussing how millions of individual property owners in America have a tremendous effect on the state of our environment. It then briefly explains why these types of dispersed problems are difficult to control through

### Abstract

Recently, a number of “green” developments have been built. Green developments will reach their potential only if residents understand the design, support the goals, and act as responsible land managers. However, studies by psychologists, anthropologists, environmental educators, and economists show that even knowledgeable, well-intentioned people frequently fail to adopt proenvironmental behaviors. This article identifies three categories of potential barriers to better individual land management: barriers to recognizing environmental problems, internal barriers to action, and external barriers to action. Two case studies show that unless barriers are addressed through education or design, individuals probably will not adopt more ecologically sensitive practices. Both cases are in the tallgrass prairie ecoregion.

**Keywords:** sustainability; land ethic; land management; land use; green development

**Robert H. Thompson** is an assistant professor in the Department of Marine Affairs at the University of Rhode Island. His current research and teaching interests include coastal community planning, the responses of coastal communities to climate change, accounting for individual behavior in environmental planning, and property theory.

regulations, a problem that makes social norms a more promising control mechanism. Second, the article argues that environmental education is only one step in the successful development of a land ethic and that planners and designers must recognize the numerous barriers to getting landowners to adopt environmentally beneficial behaviors. Drawing upon studies from psychology, environmental education, anthropology, and economics, this article identifies potential barriers to better individual land management and groups them into three categories: barriers to recognizing environmental problems, internal barriers to action, and external barriers to action. Third, this article uses two case studies to show that unless those involved in education or design efforts address these barriers to action, then it is unlikely that individuals will adopt more ecologically sensitive land management practices. The two cases studies are of the Prairie Learning Center (PLC) at the Neil Smith National Wildlife Refuge in Iowa and Prairie Crossing, which is a conservation subdivision in Illinois. Because the interpretive center and educational materials at the PLC have been praised, it could provide an exemplary case for educating visitors about the ecology of their place and provide lessons for educating residents of green developments in the ecoregion. The author was interested in determining whether the residents of Prairie Crossing understood the design of the subdivision and whether they were managing their own land in a manner that maximized the potential environmental benefits of the design. Furthermore, the author hypothesized that if residents were managing their land in an environmentally beneficial manner, then one would find evidence that features in the educational materials and the design itself enabled the residents to overcome the barriers that were identified in the literature.

### ► The Tyranny of Small Decisions and Private Land Management

While the belching smokestack might be the symbol of environmental degradation for many people, one should not underestimate the damage done by the seemingly insignificant practices of smaller landowners. The actions of millions of property owners tremendously affect environmental quality. Moreover, the actions of a few or even a single landowner can harm a sensitive environmental resource. Platt (1996, 93) points out that private owners are the “primary planners of land use” and much of the land that they own is environmentally sensitive. For example, Kostyack (1997) has asserted that more than 90 percent of threatened and endangered species rely on private land to some degree for their habitat. Similarly, environmentally sensitive coastal regions already contain half

of the world’s population, and by 2030, that percentage is expected to grow to three-quarters of the world’s population (Cullinton 1998).

Frequently, the causal connection between the land management action and the environmental harm goes undetected by the landowner. In particular, the landowner cannot recognize the negative impacts of his or her actions because it is the aggregated decisions of many ecologically linked landowners that produce ecologically disastrous results. In other words, a number of environmental problems result from what economist Alfred Kahn (1966) called “the tyranny of small decisions.” The tyranny occurs when many decision makers make small decisions that might seem individually optimal but prove to be cumulatively less than optimal. In 1982, ecologist William Odum recognized that Kahn’s theory explained the occurrence of many environmental problems.

The lawn provides an excellent example of the tyranny of small decisions because it is a land management practice where the relatively small actions of many can add up to extensive ecological damage. With approximately 63 million hectares of lawn in the United States alone, the cumulative environmental impact is tremendous (Bormann, Balmori, and Geballe 1993). Traditional lawns are essentially monocultures with relatively little wildlife value (Bormann, Balmori, and Geballe 1993; Lowen 1991). In sharp contrast, landscapes that use a diversity of native plants can sustain a comparatively remarkable diversity of wildlife (Ahern and Boughton 1994; Forman et al. 2003; Stein 1997). Large amounts of chemicals are often used to produce the “perfect” lawn, which can contribute to the pollution of surface water and the degradation of aquatic ecosystems (Bormann, Balmori, and Geballe 1993; EPA 1997; Hough 1995; Jeer et al. 1997; Schueler and Holland 2000; Beach 2002). Furthermore, lawn chemicals that get tracked into the house can persist in carpet fibers for years because they break down slowly when not exposed to sunlight, wind, rain, and soil microbes (Steingraber 2002). These landscapes can also demand water well beyond the average rainfall (Bormann, Balmori, and Geballe 1993; McConnell and Abel 1999). Landscapes that ignore the ecology of place can increase the frequency and effect of flooding by increasing the rate of water runoff over the land, thereby raising peak river flows (Ortolano 1997; Riley 1998). Lawn clippings alone make up an estimated 10 percent of all landfills (McConnell and Abel 1999). Lawns can also contribute to climate change because lawns typically sequester less carbon than other landscapes and fossil fuels are used in lawn maintenance. Because most lawnmowers do not have pollution controls, they burn far dirtier than cars (Bormann, Balmori, and Geballe 1993). In 1997 alone, 7.03 million power lawnmowers were sold in the United States, of which 1.45 million were riding mowers

(McConnell and Abel 1999). As I will show in the Prairie Crossing case, the designers tried to reduce all of these impacts by using native species where most designers would have used fescue or Kentucky bluegrass and by encouraging residents to do the same.

The fragmenting of the landscape into millions of private lots has also had a devastating cumulative impact. The destruction, fragmentation, and degrading of habitats are the primary causes of species endangerment, and much of this destruction has taken place on private land (Dramstad, Olson, and Forman 1996; Peck 1998). Habitat destruction also occurs through the spread of aggressive exotic species that private owners plant (Mooney 1988; Murphy 1988). Thus, landowners near habitat can harm wildlife by failing to properly manage domesticated animals or by planting aggressive exotic species. Once again, the Prairie Crossing case involves a design that attempts to avoid and even to a degree correct these problems. As will be discussed more fully later, the design reestablishes native habitat on former farm fields and encourages the residents to manage their yards in a manner that maximizes the size of the habitat patch and reduces the edge effects.

### ► The Tyranny of Small Decisions and the Difficult Problem of Enforcement

When it comes to environmental harms caused by the tyranny of small decisions, environmental education is particularly important, because widely shared, environmentally friendly social norms are a better way of dealing with the tyranny than government coercion. The enforcement of environmental rules relating to property management requires resources for monitoring and enforcement (Ostrom 1990). Many small and widely dispersed actions are harder and more expensive to monitor than a few large actions. In fact, too often governmental monitoring scarcely exists. For instance, even though erosion and sediment control (ESC) measures are an extremely important step in watershed protection, numerous studies have shown a dismal implementation record for ESC measures due to a lack of monitoring, a lack of understanding, and the absence of a social norm.<sup>3</sup> With widely dispersed behaviors such as overfertilizing yards, planting invasive exotics, pouring oils and chemicals into storm drains, or destroying wetland buffers, government monitoring and coercive enforcement is not a promising social control.

While preventing environmental harm by individual landowners is important, the Prairie Crossing case will also show that the ultimate aim should be land management that creates environmental benefits. Ecological land management on even a relatively small scale can greatly benefit many species that,

while not necessarily endangered, nonetheless enrich the world and our lives (Hough 1995). Moreover, if one could get a large percentage of private owners to manage their property in a manner that contributes to healthier ecosystems, one would have an example of a type of phenomenon that Carol Rose (1994) has called “the comedy of the commons.” The happy comedy occurs in those situations where the more people share in an activity (that is, the greater the collective activity), the greater the value of the commonly produced good. In this case, as more people share in a land ethic, ecosystem health continues to improve and the greater the benefits for everyone.

### ► Getting from Ecological Information to Environmental Action

While education is a necessary step in the process of encouraging more environmentally sensitive land management, education alone is not a sufficient step. In fact, even when information successfully changes attitudes, it often does not change behavior.<sup>4</sup> As Paul Stern (2000, 525) has pointed out, “The initiation of pro-environmental behavior is typically affected by several interacting factors: environmental concern, attitudes, information, beliefs, abilities, external conditions that facilitate or impede particular actions, and so forth.” A lack of ecological knowledge is just one of a number of barriers that must be identified and removed. Barriers might include coping devices, incorrect but well-established cultural models, real and perceived inconveniences, and social pressure to not behave proenvironmentally. So if the residents at Prairie Crossing have altered their behavior in significant ways that benefit the overall design of the development and, hence, the environment, then the designers of Prairie Crossing and its educational materials must have found ways to overcome these types of barriers.

For the purposes of this article, the barriers are grouped into three categories: barriers to recognizing environmental problems, internal barriers to taking proenvironmental action, and external barriers to taking proenvironmental action.

- Barriers to recognizing environmental problems:
  - the lack of ecological knowledge and
  - difficulties in recognizing or perceiving the environmental problem.
- Internal barriers to taking proenvironmental actions:
  - the presence of defense and distancing mechanisms,
  - the persistence of faulty cultural models,
  - the lack of an appropriate cultural model for living sensitively with nature,

- the lack of practical knowledge for implementing pro-environmental behavior, and
- the perceived difficulty of implementing the practical knowledge.
- External barriers to taking proenvironmental actions:
  - prevailing social norms against proenvironmental behavior and
  - the absence of social norms that support pro-environmental behavior.

### Barriers to Recognizing Environmental Problems

*Lack of local ecological knowledge.* Residents in most communities have little or no knowledge about how their local ecosystems functioned before they were turned into farm fields or development. Consequently, they can easily overlook the environmental degradation that surrounds them. Indeed, psychologist Peter Kahn (1999) has shown that people who live in highly polluted environments and who understand the concept of pollution can nonetheless believe that their environment is not particularly polluted because they have never known a less degraded environment. As the community memory of a healthier environment fades, standards and expectations decline. When one perceives environmental degradation as natural, one cannot recognize environmental problems and move toward action. Kahn has labeled this phenomenon “generational environmental amnesia.” For example, people living in a developed watershed frequently think that it is natural for the local stream to rise rapidly during any significant rain event, only to return to a trickle between storms. Environmental amnesia should not be surprising because we have so thoroughly modified the presettlement landscape. For instance, in the area of Prairie Crossing and the PLC, less than 1 percent of the original northern tallgrass prairie remains (Kline 1997).

*Difficulties in recognizing or perceiving the environmental problem.* Even if people are taught about local ecological processes, errors in information processing form another barrier to action. For example, if we do not directly see the effects of our environmentally damaging behavior, we are much less likely to believe that the damage is occurring when we are told about it. Unfortunately, many environmental problems have time lags or attenuated causation that makes it difficult to perceive the connection between actions and problems (Kollmuss and Agyeman 2002). This is one reason “people often underestimate the number of environmentally destructive, everyday behaviors and instead exaggerate the occurrence of rarer,

more dramatic ones” (Winter 2000, 520). The tyranny of small decisions is the aggregation of exactly this type of overlooked or ignored behavior.

Unfortunately, our built environment frequently hides environmental connections. Residents typically have little or no idea what happens to water after it drops into the storm drain and disappears into an underground system of pipes. As we will see, at Prairie Crossing, the storm water system is above the ground. Thus, the environmental education is not abstract but observable. Moreover, the visibility of the on-site system seems to have made it easier for residents to comprehend the more abstract connections of the larger hydrological system.

*The connection between awareness, emotional involvement, and proenvironmental action.* Research shows that having an emotional reaction to an environmental problem is an important factor in motivating proenvironmental behavior (Kollmuss and Agyeman 2002). Not surprisingly, people who know they have been harmed by an environmental problem are far more likely to be environmentally active (McKenzie-Mohr et al. 1995). Generational environmental amnesia and difficulties in perception, however, prevent people from recognizing the harm that would lead to an emotional connection that might motivate action. Quite importantly, a positive interaction with nature can encourage proenvironmental behavior. Because well-designed conservation subdivisions could create more opportunities for positive interactions with nature than conventional subdivisions, they could become an important factor motivating proenvironmental actions on- and off-site (see Chawla 1999).

### Internal Barriers to Taking Proenvironmental Actions

*The presence of defense and distancing mechanisms.* Even if people learn about their local ecology and learn to recognize an environmental problem, they can use a variety of defense mechanisms that allow them to continue behavior that they know is environmentally damaging. For instance, one can easily rationalize behavior because it is not contributing much to the problem or because a change in behavior would not do much to solve the problem (Winter 2000). The latter rationalization is a variation of the old “tragedy of the commons” in that doing the right thing seems pointless in the face of widespread irresponsible behavior in the community (Hardin 1968). Denial and displacement enable people to avoid thinking about the environmental problem or to convince

themselves that it is somebody else's problem or fault. People also emotionally distance themselves from the problem by belittling the messenger—"those radical environmentalists."

Not surprisingly, the more a person believes that they will be affected by an environmental problem, the more likely they are to take action (Baldassare and Katz 1992). Still, whether someone takes constructive action is a combination of the perceived directness of the threat, the perceived locus of control, and the perceived difficulty of taking action. "High perceived threat without the perceived ability to cope leads to maladaptive responses, such as minimizing the danger or unfocused emotionality" (Stern 2000, 526).

A person might also simply be in denial. For example, a person can refuse to believe the evidence that ties her or his actions to environmental problems because she or he really wants to continue the behavior (Kollmuss and Agyeman 2002).

*The persistence of faulty cultural models.* Environmental education does not start with a blank slate. People already have cultural models that they use to understand how the world works. Cultural models are imaginative structures that people use to evaluate experiences, interpret observations, make judgments, resolve problems, and make classifications. Often they are simplified representations that highlight selected features of our biophysical and social environments. Sometimes people use cultural models consciously, but often they are so taken for granted within a group that they seem like commonsense (Kempton, Boster, and Hartley 1995; Holland and Quinn 1987). A cultural model that fails to accurately trace the consequences of actions can lead people to unintentionally manage resources in an unsustainable manner. Replacing faulty models, however, can be difficult because people can tenaciously cling to them (McKenzie-Mohr 2000). This can result in "inert learning," such as when "the student who learns a new 'correct' model in science class but then fails to apply it to real-life problems, reverting instead to older, incorrect mental models when outside the immediate learning context" (Gentner and Whitley 1997, 222). So unless one understands how someone else conceptualizes a system, one cannot accurately predict behavior and successfully design educational materials (see, e.g., Gentner and Whitley 1997; Kempton 1987). The lawn industry spends millions of dollars yearly reinforcing a manicured and chemical dependent cultural model of the proper yard.

*The lack of an appropriate cultural model for living sensitively within nature.* Through cultural models, we focus on specific interactional possibilities with our social and biophysical world (Lakoff 1996). Consequently, people may need new cultural

models if they are to interact with the biophysical world in a more ecologically healthy manner. Unfortunately, environmental education can utilize cultural models of nature that discourage people from thinking about how their everyday behavior affects local ecological processes. Cultural models of this type include *nature is history*, *nature is wildness*, and *nature is a place apart*. While such models are not "incorrect," other models are needed to understand everyday interactions and to create a land ethic that can create an ecologically healthy landscape. As will be seen below, Prairie Crossing has had a very clear, competing cultural model for how yards should look and function.

*The lack of practical knowledge for implementing environmentally positive behaviors.* "Practical knowledge" refers to the technical, economic, social, and scientific knowledge that will be required to take on-site education and put it to use in one's own life. Without practical knowledge, changes in ecological knowledge, environmental attitudes, and values cannot bring about successful behavioral changes (Hines, Hungerford, and Tomera 1987). For example, if a landowner does not know which plants are aggressive exotics, which are good for wildlife feeding, or which require little or no artificial inputs, then that landowner simply cannot create an environmentally sensitive landscape.

*The perceived difficulty of implementing practical knowledge.* People can fail to take proenvironmental actions because they believe that the actions will be difficult or unpleasant (McKenzie-Mohr and Smith 1999). If these beliefs are unfounded, then we must find ways to convincingly demonstrate that the beliefs are erroneous. If, on the other hand, the activity will be difficult or unpleasant, we will have to find ways to make it easier and less offensive. One could include this barrier under the lack of practical knowledge, but it is worth highlighting. Similarly, if actions are taken to make proenvironmental behavior easier or less offensive, then one could classify it as removing an external barrier.

## External Barriers to Taking Proenvironmental Actions

*The presence of social norms that oppose environmentally positive behavior and the absence of social norms that support environmentally positive behavior.* Social norms, which act as implicit rules regarding how people should behave, have been found to influence responsible environmental behavior (Manzo and



Weinstein 1987). Generally speaking, norms affect behavior in two ways: compliance and conformity (McKenzie-Mohr and Smith 1999). With compliance, individuals change their behavior in hope of being rewarded or out of fear of being punished. With conformance, individuals listen to and watch other people and then follow the norm because they believe it is the proper thing to do. Unfortunately, some deeply ingrained social norms conflict with attempts to implement more environmentally sensitive land management.

One weekend, the *Des Moines Register* in Iowa provided an excellent example of how norms can perpetuate poor environmental practices and how norms and cultural models are closely linked. On Saturday, the *Register* ran an article praising the virtues of Iowa's remaining prairie remnants. The article invited the reader to see "the richness of the prairie habitat" and raved about a thirty-acre preserve that had 370 plant species (Probasco-Sowers 1999). The next day, the *Register* ran an article on how to grow the perfect monoculture lawn (Fowler 1999).

The first point is about norms. We have been taught that the perfect lawn is the desired norm. Landscaping that would be better suited to the tallgrass prairie ecoregion conflicts with this norm. In fact, many city ordinances make a yard landscaped in prairie grasses and forbs illegal (Rappaport and Horn 1998). The second point is about cultural models. The *Des Moines Register* utilizes cultural models of prairies as history, as wildness, as a place to visit and not to live—even though the lawn is on prairie soils in a prairie climate where there used to be a prairie hydrology, flora, and fauna.

A close relation can also exist between attempts to establish new proenvironmental social norms and getting individual commitment to that behavior. As will be seen in the Prairie Crossing case study, environmental education can be an important step in establishing new community norms. An important next step occurs when individuals within the community publicly commit to the new behavior. Publicly visible commitment makes it easier for others to adopt the new proenvironmental behavior. Moreover, when an individual announces his or her commitment, that individual is more likely to continue the behavior because people want to act consistently with their publicly stated convictions (McKenzie-Mohr and Smith 1999). Finally, the public commitment to the proenvironmental behavior is an important educational tool in its own right. "Other people's behaviors provide important information for communicating appropriate action, and people frequently change their environmentally relevant behavior as a result of *social diffusion*—they do as others around them do" (Winter 2000, 519).

## ► Method

The two cases were chosen for a number of reasons. Both places have been singled out as exemplary models from within the same ecoregion: the PLC for environmental education and interpretation and Prairie Crossing as a green development. More important, for the purposes of theory building, the author believed that both cases would be critical cases (Yin 2003) for testing the theory that unless environmental education and physical design address the above-described barriers to action, then it is unlikely that individuals will adopt more ecologically sensitive land management practices. Furthermore, because the PLC exhibits what many believe to be an excellent example of environmental education and interpretation for the tallgrass prairie ecosystem, it would presumably be a good resource for educational materials and ideas for designers of green developments in the region.

Both case studies involved multiple sources of evidence. In the PLC study, the author and two graduate assistants visited the site on multiple occasions. The team videotaped all of the exhibits and a super-wide-screen movie that visitors can see. The team also collected all of the educational materials that were available to visitors. The audio portions of the exhibits and the movie were transcribed and the written materials were copied into rich text files so that all of them could be stored in the computer program NVivo (Bazeley and Richards 2000). Photographs were scanned so that they could be linked to the NVivo project. In the Prairie Crossing case, the author visited and photographed the site. All of the available promotional brochures, educational materials, and Web pages were entered into the NVivo project. Two different research assistants worked on the Prairie Crossing case.

All of these data were treated as text for purposes of analysis and coding (Ryan and Bernard 2000). After reading all of the materials, the research team developed a "start list" of possible categories for coding that was based upon the literature from which the barriers to action were derived and upon themes that emerged from the initial readings of the texts (Coffey and Atkinson 1996). The research team was particularly interested in cultural models of nature and human interaction with nature and, therefore, paid particular attention to metaphors, repetitions, and narratives (Ryan and Bernard 2000). Based on the start list, each member of the team would independently try to code the same text document in NVivo. Whenever a researcher could not code a segment of text, the researcher either added a new category or modified an existing category. The team would then compare and discuss their work and revise the coding scheme. This process continued until no sig-

nificant changes were being made to the coding scheme. Then one research assistant from each case coded five text documents and then either the author or the other research assistant coded the same documents. The level of agreement between the two coders was calculated as

number of agreements/number of coding decisions.

Because the agreement ranged from 86 to 100 percent, the research team proceeded to code all of the text documents.

Two team members conducted thirty-seven exit interviews of randomly selected visitors of the PLC on three separate occasions. The interviewees were randomly selected by interviewing the *n*th adult to exit out a preselected door after the end of the last interview. The interviewers adjusted *n* to accommodate busy and slow times. Because the researchers were very familiar with the exhibits, movie, and educational handouts, they were able to conduct focused interviews of the visitors (Merton, Fiske, and Kendall 1990).

Telephone interviews were conducted with residents of Prairie Crossing. Using the street addresses from the development, all of the listed telephone numbers were obtained from a reverse telephone directory. Sixty telephone numbers were randomly selected using a random number table. The selected residences were sent letters informing them of the research and that the team would be calling. Forty-one telephone interviews were successfully conducted. More open-ended questions were asked of Prairie Crossing residents than PLC visitors due to more relaxed time constraints.

Both the exit interviews and the telephone interviews were entered into NVivo and coded using the coding book. A somewhat abbreviated process was used to the one discussed above and some categories were added.

### ► Creating a Land Ethic: Nature as Other versus Nature as Neighborhood

#### The PLC

The Neil Smith National Wildlife Refuge is a massive prairie reconstruction. Fifty years ago, Leopold (1949/1968) lamented,

No living man will see again the long-grass prairie, where a sea of prairie flowers lapped at the stirrups of the pioneer. We shall do well to find a forty [acres] here and there on which the prairie plants can be kept alive as species. (P. 189)

Neil Smith attempts to prove Leopold wrong by taking approximately eight thousand acres of row crops and pastures and

turning them back into prairie and savanna, complete with new herds of buffalo and elk. The PLC at Neil Smith is an expansive facility filled with exhibits on prairie ecology and the cultural history of the tallgrass prairie.

One might expect the U.S. Fish and Wildlife Service (FWS) to produce movies, exhibits, and brochures that concentrate on scientific knowledge to overcome the first barriers to proenvironmental behavior, that is, a lack of ecological knowledge and generational environmental amnesia. In fact, virtually every PLC text contained a sizable amount of value knowledge that was designed to win support for the project by highlighting particular cultural models. The PLC texts relied heavily on two types of cultural models that the team coded as *nature is our cultural history* and *nature is wildness*. Although these cultural models seemed to do a good job motivating support for the prairie reconstruction, they also emphasized interactions with nature that made the reconstruction seem irrelevant to, if not in conflict with, the everyday lives of almost all the interviewees.

The *nature is wildness* theme appeared repeatedly in the PLC texts. Aspects of the biophysical world were frequently portrayed as wild, both literally and metaphorically. The following examples are from the short, but spectacular, wide-screen movie that is shown at the PLC (*italics added*):

But fire had its own *wildness*. . . . There was nothing to *stop a hungry fire*. Prairie winds urged it to *devour* the drying grasses along a front miles long. [During this sequence, images of a burning prairie cover the wide screen and images of animals running (presumably for their lives) are periodically interjected.]

Vast herds [of buffalo] consuming the grass and lifting plumes of grass and they *ran wild, wild as the wind*. [Large herds of buffalo running across the prairie sweep back and forth across the screen until the buffalo are running straight at the viewer.]

While the language and images might instill a sense of awe and, hence, value in the visitor, this emphasis on wildness makes it difficult for the visitor to see the daily relevance of the environmental education. Historian William Cronon (1995) has warned us about this very type of overemphasis on the “wild”:

Idealizing a distant wilderness too often means not idealizing the environment in which we actually live, the landscape that for better or worse we call home. Most of our most serious environmental problems start right here, at home, and if we are to solve those problems, we need an environmental ethic that will tell us as much about *using* nature as about *not* using it. (P. 83)

Undoubtedly, the strong emphasis on the buffalo is, in a sense, a smart marketing strategy. Stephen Kellert’s (1986)

work has shown that the public cares about and supports the protection of large, charismatic megafauna. Indeed, interviewees frequently mentioned that they had either come to Neil Smith to see the buffalo, that the buffalo were the reason that prairies are important, or that the buffalo were their favorite part of the experience. Still, the emphasis on buffalo makes it more difficult for visitors to see any relevance to their own lives.

Similarly, when we rely too heavily on the *nature is our cultural history* model, we risk idealizing nature as a lost past and making it seem irrelevant to daily behavior. At times, the PLC texts speak of the prairie reconstruction as a kind of living museum. For example, the movie's narrator speaks of "Vague memories of a wildness long past." A brochure about the PLC explains, "We're taking action to preserve our natural heritage." A trail guide claims the trail "will take you back to what the Tallgrass Prairie once was." Since at least the time of Teddy Roosevelt, Americans have responded positively to the idea of *nature is our cultural history* (Nash 1982). When asked in the exit interviews why they thought the PLC was important, many interviewees mentioned that it was important to preserve this part of our, that is, America's, past.

The exit interviews did show that people learned things about prairie ecology. Some mentioned how deep the roots of the prairies went.<sup>5</sup> Some also talked about learning about the complexity of the prairie ecosystem. Still, while the interviews showed strong support for the prairie restoration and frequent assertions that prairies are important, almost none of the interviewees expressed an intention to change their land management practices. The PLC provided no cultural model or practical knowledge for living within the tallgrass prairie ecoregion. While a few interviewees mentioned renewed or greater support for protecting areas from development, this preservation model does not encourage a take-home land ethic.

The PLC also miss an opportunity with gardeners. When asked about whether the PLC visit would cause them to do anything differently, twenty-three interviewees mentioned something about gardening. Many were using or were interested in using the more showy prairie flowers in their gardens. Some talked about how they already did more environmentally sensitive gardening, but their comments did not seem to relate to the PLC. Only four talked about a diverse landscape planting modeled on the presettlement prairie. Three of these interviewees owned farms and had many acres to devote to their project. One had ten acres, and he intended to "let it go wild." Evidently, these three saw how the images and texts in the PLC could be transferred to their own relatively large land holdings. One interviewee talked about the fact that prairie plants did not need "Chem Lawn," but she knew this before her visit. The fourth person talked about the natural drought resistance of prairie plants and planting prairie in her own suburban

yard, but she had gained her practical knowledge from a friend who volunteered at the Neil Smith reconstruction. Moreover, her comments about management practices show the operation of social norms that are opposed to more ecological management. "I'm more interested in planting wildflowers at home in my garden. I don't think our neighbors will let us burn. Living in suburbia, it's a little difficult." Only a few other visitors talked about the benefit to wildlife of prairie plants. None of the interviews talked about how prairie plantings could improve water quality.

### Prairie Crossing Conservation Community

Prairie Crossing in Illinois provides an interesting contrast to the PLC. A number of authors have cited Prairie Crossing as a very good example of an environmentally sensitive or green community (Arendt 1999; Beatley and Manning 1997; Wilson et al. 1998). The development of Prairie Crossing will be a 667-acre, 362-home, cluster development that will be more than 60 percent open space and that includes restored prairie, wetlands, a lake, an organic farm, and a surface storm water management and treatment system (see <http://prairiecrossing.com/>). While the lake is part of the storm water system, the developer intended it to be a recreational facility for boating and swimming. A trail system runs through the open space and ties into a larger regional trail system. All of the residents received a newsletter called "EcoNotes," which covered such topics as the burning of the prairie, the impact of yard management on the lake, the use and benefits of landscaping with native plants, how to use storm water to build "a small pond and wetland area" in one's yard or with one's neighbors, and how to attract beneficial or attractive insects. The developer (through the homeowners association) hired an on-site "environmental team leader" who periodically held workshops for residents. When residents moved in, they were required to devote at least 20 percent of their yard to the very unconventional prairie plantings. According to a recent *Chicago Tribune* story, "Some of the front 'lawns' look like the owner forgot to pull the weeds, but the landscaping actually is a mix of prairie plants" (Handley 2002) (see Figure 1). Even though the prairie plantings are unconventional and no one has been required to maintain the 20 percent, the actual percentage of the prairie plantings in residents' yards seems to be increasing markedly.

Clearly, the developer did a very good job of conveying practical knowledge. Because the developer could act as the official voice of the community as new residents moved in, the official "norm" was that the new prairie model of landscaping was acceptable and encouraged. Moreover, by requiring the 20





**Figure 1.** House at Prairie Crossing with prairie planting front yard.  
Source: Photo by the author.

percent minimum, the developer essentially forced the residents to learn how to do prairie plantings and to discover that it was not that hard.

The Prairie Crossing case study was structured similarly to the PLC study. All of the available promotional brochures, educational materials, Web pages, and telephone interviews with residents were transcribed, entered into NVivo, and coded by the research team. The author visited the site to familiarize himself with its features.

While the residents were of course self-selecting in that they chose to buy a home in Prairie Crossing rather than in a conventional subdivision, they are probably reasonably similar to other home buyers who will choose to live in any green development. The majority of the interviewees did not necessarily define themselves as strong environmentalists when they moved in and none of them were knowledgeable about prairie restoration. Many reported that they were attracted to the open space or the neotraditional aesthetic of the development but that they did not understand fully the environmental objectives.

Every interviewee reported maintaining at least the original prairie plantings, and 85 percent reported expanding their plantings beyond the required 20 percent. Most had the majority of their yards in prairie. Everyone we interviewed reported an increase in knowledge about prairie plants and wildlife as well as local hydrology and nonpoint source pollution. Moreover, almost everyone has taken additional steps to manage their own yards in a more ecologically sensitive manner. For example, they reduced or eliminated their chemical use or created pond habitats. Thus, based upon the initial findings, PC appears to be a success in that many of the residents

understand the design and are maximizing the design's potential by managing their own yards in an environmentally sensitive manner. If one looks back at the barriers to proenvironmental action, one can see how Prairie Crossing has overcome many of these barriers.

The first barriers are a lack of ecological and practical knowledge. Because Prairie Crossing was designed for living and not visiting, the developer not only provided ecological knowledge but practical knowledge and a cultural model for interacting with local ecological processes. The developer provided detailed practical information through the newsletters, held workshops, and had the large common prairie restorations that acted as

a demonstration project. From the developer, residents could learn a good deal about cultivating native plants, the animals that might be attracted, and about managing their own storm water. The following excerpts from interviews illustrate residents' learning about storm water management and invasive exotics.

[I started] understanding more about how the site functions in terms of the wetlands and the swales. A pretty unusual way of treating stormwater through swales and down into the marshes. It's important that people try to understand that we're discouraging them from using a lot of chemicals on the lawns. All of the water eventually runs into the lake and then into the creek and then to the Des Plaines River.

An interesting aspect of this quote is that the homeowner not only shows an understanding and appreciation of the onsite storm water treatment but also a comprehension and concern for the much larger watershed hydrology. Another resident stated,

I've learned an awful lot about how prairies function. What it really takes to create one that works well. And I didn't have a clue before. I mean I planted purple loosestrife [an attractive but aggressive exotic]. I bought it and planted it. That's one of our worst nightmares here. I've really changed because I just had no awareness of this.

In this case, not only has the interviewee gained ecological and practical knowledge, she has replaced a purely aesthetic cultural model of landscaping with one that includes prairie ecology as an important component. Quite importantly, the quote also hints at the establishment of supportive social norms for the new model when she refers to "one of *our* worst night-

mares.” As will be discussed more fully below, the residents themselves have become an essential source for both education and the establishment of the prairie landscaping ethic.

While the developer initially was an important source of ecological and practical knowledge, other sources emerged. Residents began discussing prairie plantings and the health of their lake in the homeowners association newsletter and on a community listserv. Neighbors also started talking amongst themselves about prairie plants and what worked in their own yards. Interviewees reported that just seeing what other people were doing was a source of information. For example, even though an EcoNote explained how to create small pond habitats with storm water, one interviewee reported building such a pond after seeing her neighbor do it. Neighbors also began exchanging seeds, which greatly lowers the cost of planting and builds commitment to a common enterprise. Several interviewees mentioned the formation of a local chapter of Wild Ones, a national nonprofit organization that advocates landscaping with native plants. One interviewee explained, “The Wild Ones tr[ies] to help people understand the purpose of prairie plantings but also how to do it. People are a little intimidated about digging up their lawn.” The interviewee identified three barriers that Wild Ones helped to overcome: the lack of a cultural model to make sense of prairie plantings, the lack of practical knowledge, and the belief that the unfamiliar activity might be too difficult.

Not only were neighbors a source of information, these activities were part of the development of a social norm. For example, when asked whether the fact that other residents had planted prairie made it easier for him to do so, an interviewee answered,

Absolutely. First of all, it's not illegal. In a lot of places if you try to do what we've done in our yard, somebody from the village would come and tell you to mow your grass. It's sort of a battle in some places to use plants that some people consider weedy in your yard. But here it's really encouraged. Your neighbors don't get upset.

Another resident talked about watching new residents learn new cultural models for landscaping and new norms:

I think it's been really interesting to watch the place grow. Especially to watch people go through this educational process and beginning to understand what's going on here.

The ritual of burning prairies reinforced the social norm of planting prairies. While the author knew that the large, common prairie reconstructions at Prairie Crossing were periodically burned, he was quite surprised to learn that residents were burning their residential lots.<sup>6</sup> Five residents talked about how enjoyable it was to get together with their neighbors to burn one another's prairies. One resident also spoke about

how engaging it was to join other residents in burning the large common prairies.

[Having the volunteers burn] saved the community a whole bunch of money and it was fun. It was like a barn raising, only it was a barn burning. So, it was a lot of fun. It was interesting because it was powerful. A couple of times the fire got really big, but we were with somebody who knew what he was doing. It was controlled. It was very, very interesting how we all got into it. Six to eight of us. We got very focused. We were very intensely into it and it seems very rewarding.<sup>7</sup>

While no one reported feeling pressured to keep their prairie plantings or to refrain from using chemicals in their yards, several residents said that they and the developer “encouraged” residents to follow the more natural route.

Other barriers that were discussed above were the difficulty of seeing the connection between behavior and the environmental problem and a belief that one's individual contribution (either negative or positive) did not matter. Prairie Crossing seems to get over these barriers in a number of ways. For example, while the constructed lake is part of the storm water management system, the developer put a sand beach on the lake and created the expectation that it would be boatable, fishable, and swimmable. This created high expectations for water quality among the residents. Moreover, the aboveground storm water system and the on-site lake helped residents to see the connection between their own yard management and water quality. Residents saw that they are making a small contribution to a larger effort. As one resident explained when talking about her habitat pond, “I feel like we're doing our little part, slowing that water down, giving it someplace to infiltrate.” When people think they can only make a small contribution, they can rationalize inaction because small actions are either ineffective or inconsequential. But in the case of a well-designed and well-understood conservation subdivision, residents can conceptualize small actions as a larger, unifying effort. Residents at Prairie Crossing also reported seeing butterflies, birds, and small mammals like minks coming to their yards. Furthermore, they understood that the more all the residents participated in the management effort, the greater the environmental benefit and the more wildlife they would see. These animals acted as tangible signs of success and created community pride.

We have bird species here that you just don't see in other subdivisions. As people live here and they observe the native plantings, more and more, they really grow to like it. And this is why we're seeing more and more people take up their turf grass.

On the other hand, when the lake experiences an algae bloom or invasive exotics appear, those also act as prompts. The residents can see positive and negative results, which makes it harder to deny the problem or to rationalize a lack of action.

## ► Conclusion

The relatively small impacts of numerous private property owners can add up to big environmental problems. Consequently, there is a growing recognition that we need to design and build communities that respect and work with local ecological systems. However, even the best designs will not reach their full potential if the residents do not understand the design and develop a local land ethic that allows them to become good environmental stewards. While environmental education will play an essential role, environmental educators have become well aware of the gap between education and action (Kollmus and Agyeman 2002), and the PLC case shows how a traditional model of environmental education can educate without altering behavior. Moreover, psychologists have shown that even people who know and care about an environmental issue may still find a number of ways to rationalize not taking action. Thus, if designers of green developments are going to change behavior, they need to recognize barriers to change and then design their educational materials and their developments in ways that overcome those barriers. Prairie Crossing seems to be succeeding in part because the designers and the community members themselves have overcome many of the potential barriers that have been discussed in this article. The environmental educational materials are highly practical and aimed at implementation at home. The design of Prairie Crossing also helps the residents to recognize environmental problems that would go unnoticed in a typical community. For example, because the storm water is not directed into underground pipes to unknown locations but instead travels overland to a lake, residents know where their storm water goes and they can see if the lake experiences algae blooms. Quite importantly, a community cultural model for the lake has been established that it should be fishable, boatable, and swimmable. The model varies dramatically even from the model for a detention pond. Another example is that the residents now see typical suburban yards as relatively lifeless and view this lifelessness as an environmental problem. By establishing a large prairie restoration, by requiring that 20 percent of a resident's yard be dedicated to prairie plantings, and by providing continuing support and pointers, the developer helped establish a new cultural model for a yard and dispel concerns that the new prairie planting model might be too difficult. State and local government could play a similar role by removing city ordinances that prohibit native plantings and landscaping government buildings and properties more responsibly.

At Prairie Crossing, the community members played a central role in the diffusion of ecological and practical knowledge and the development of new cultural models. Their very yards

were a powerful sign of commitment to the new ethic, and the exchanging of seeds and advice created new practical ecological information and strengthened social ties. Finally, the residents seemed to understand that they had previously been involved in the tyranny of small decisions but that they are now involved in cooperatively creating the comedy of the commons. Although none of them would have used those terms to describe the switch, they were certainly aware that their past, seemingly benign, land management practices were actually contributing to environmental problems. They were also aware that together they were helping to restore ecosystem services. Clearly they are enjoying the process and product of their common enterprise.

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## ► Notes

1. For examples of green developments, see Arendt (1999); Beatley and Manning (1997); Beatley, Brower, and Schwab (2002); and Wilson et al. (1998).
2. According to Sim Van Der Ryn and Cowan (1996, 57), "Ecological design begins with the intimate knowledge of a particular place." Michael Hough (1995, 40) states, "Urban environments that are sustainable are also place-specific; . . . they are rooted in their particular landscape and, consequently, establish regional identity."
3. For example, in King County, Washington, a study found that 95 percent of monitored construction sites had either improperly installed or poorly maintained erosion controls, undermining the effectiveness of the regulatory program (Burrows and Weller 1996). See Brown and Caraco (1997) for a description of numerous studies.
4. See Kollmus and Agyeman (2002), McKenzie-Mohr and Smith (1999), and Winter (2000) for reviews of numerous studies showing that environmental education did little or nothing to produce more environmentally sensitive behavior.
5. The roots of many prairie plants can extend down to five to seven feet, making the plants resilient to fire and resistant to drought. It also accounts for the incredible depth of the prairie top soil (Kline 1997).
6. Fire is part of prairie ecology. Fires were caused by lightning and over the past five to six thousand years lit by Native Americans (Pauly 1997).
7. Jordan (1994) writes about how prairie burns have become a ritual that reconnects participants with their local environment.

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